AN2752
Application note

Getting started with the STM8S and STM8A

Introduction

This application note complements the information in the STM8S and STM8A datasheets by describing the minimum hardware and software environment required to build an application around an STM8S and STM8A 8-bit microcontroller device. It is divided into the following sections:

- Power supply
- Analog-to-digital converter (ADC)
- Clock management
- Reset control and development
- Debugging tool support
- STM8 software toolchain
- Setting up the STM8 development environment

This application note also contains detailed reference design schematics with descriptions of the main components. In addition, some hardware recommendations are given.

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1 Hardware requirements summary

In order to build an application around an STM8S or STM8A device, the application board should, at least, provide the following features:

- Power supply
- Clock management
- Reset management
- Debugging tool support: Single wire interface module (SWIM) connector

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2 Power supply

2.1 Power supply overview

The device can be supplied through a 3.0 V to 5.5 V external source. An on-chip power management system provides the 1.8 V digital supply to the core logic, both in normal and low power modes. It is also capable of detecting voltage drops, on both main external (3.3 V/5 V) and internal (1.8 V) supplies.

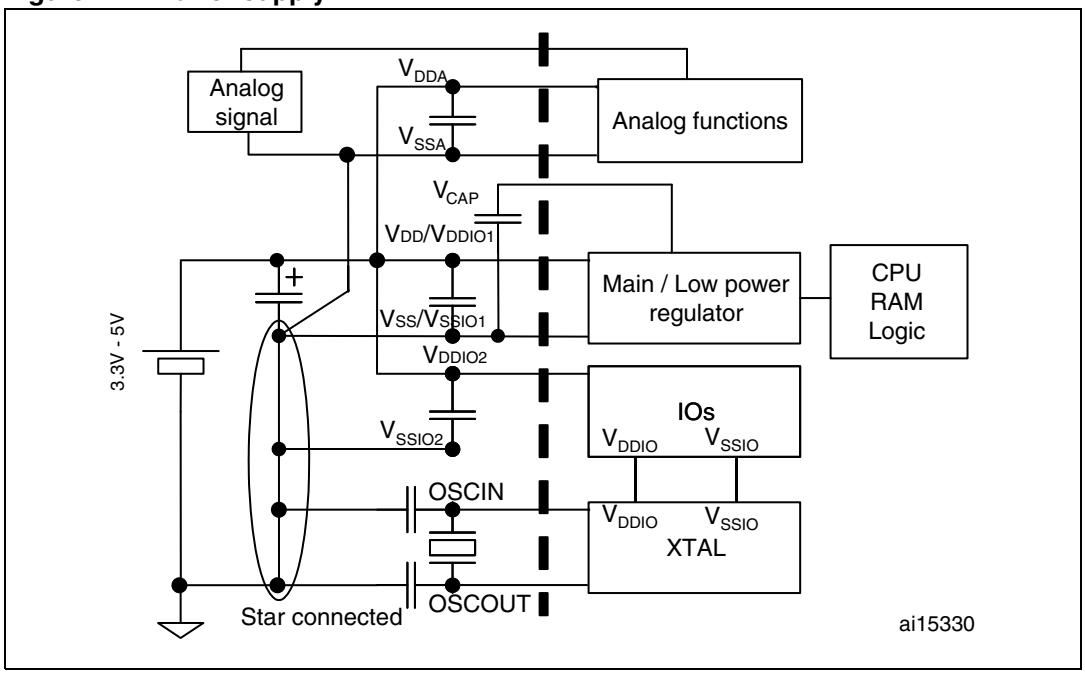
The device provides:

- One pair of pads V_{DD}/V_{SS} (3.3 V ± 0.3 V to 5 V ± 0.5 V) dedicated to the main regulator ballast transistor supply.
- Two pairs of pads dedicated for V_{DD_IO}/V_{SS_IO} (3.3 V ± 0.3 V to 5 V ± 0.5 V), which are used to power only the I/O's. On 32-pin packages, only one pair is bonded.

Note: For V_{DDIO}/V_{SSIO} next to V_{DD}/V_{SS}, it is recommended to connect these two pairs together and to use only one decoupling capacitance. The purpose is to ensure good noise immunity by reducing the connection length between both supplies and also between V_{DD}/V_{DDIO} and the capacitor.

- One pair of pads V_{DDA}/V_{SSA} (3.3 V ± 0.3 V to 5 V ± 0.5 V) dedicated to analog functions. Refer to *Section 3: Analog-to-digital converter (ADC) on page 10* for more details.

Figure 1. Power supply



Note: The capacitors must be connected as close as possible to the device supplies (especially V_{DD} in case of dedicated ground plane).

Placing a crystal/resonator on OSCIN/OSCOUT is optional. The resonator must be connected as close as possible to the OSCIN and OSCOUT pins. The loading capacitance ground must be connected as close as possible to V_{SS}.

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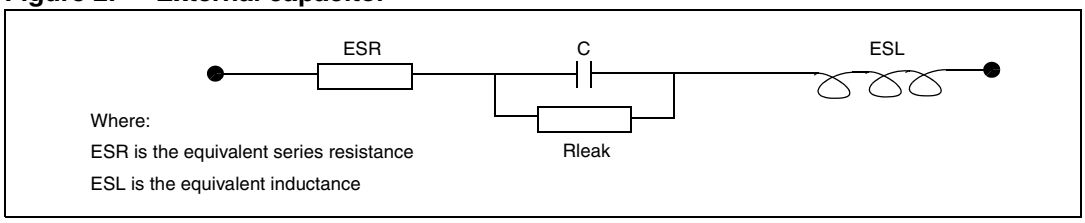
2.2 Main operating voltages

STM8S and STM8A devices are processed in 0.13 µm technology. The STM8S and STM8A core and I/O peripherals need different power supplies. In fact, STM8S and STM8A devices have an internal regulator with a nominal target output of 1.8 V.

Stabilization for the main regulator is achieved by connecting an external capacitor C_{EXT} to the VCAP pin. Please refer to the STM8S or STM8A datasheets for more information on the VCAP capacitor characteristics. Care should be taken to limit the series inductance to less than 15 nH.

Figure 2. External capacitor



2.3 Power-on/power-down reset (POR/PDR)

The input supply to the main and low power regulators is monitored by a power-on/power-down reset circuit. The monitoring voltage range is 0.7 V to 2.7 V.

During power-on, the POR/PDR keeps the device under reset until the supply voltages (V_{DD} and V_{DDIO}) reach their specified working area.

At power-on, a defined reset should be maintained below 0.7 V. The upper threshold for a reset release is defined in the electrical characteristics section of the product datasheet.

A hysteresis is implemented (POR > PDR) to ensure clean detection of voltage rise and fall.

The POR/PDR also generates a reset when the supply voltage drops below the $V_{POR/PDR}$ threshold (isolated and repetitive events).

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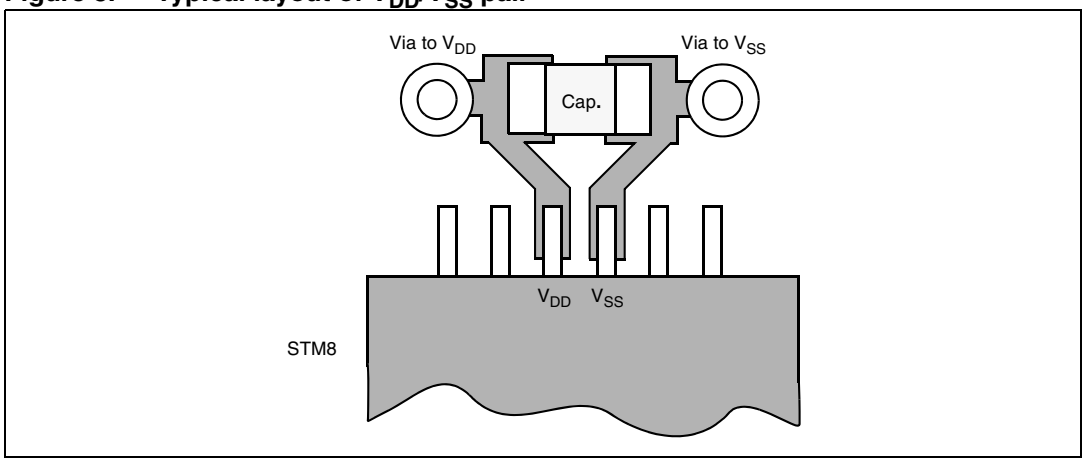
Recommendations

All pins need to be properly connected to the power supplies. These connections, including pads, tracks and vias should have the lowest possible impedance. This is typically achieved with thick track widths and preferably dedicated power supply planes in multi-layer printed circuit boards (PCBs).

In addition, each power supply pair should be decoupled with filtering ceramic capacitors (C) at 100 nF with one chemical C (1..2 µF) in parallel on the STM8S or STM8A device. The ceramic capacitors should be placed as close as possible to the appropriate pins, or below the appropriate pins, on the opposite side of the PCB. Typical values are 10 nF to 100 nF, but exact values depend on the application needs. *Figure 3* shows the typical layout of such a V_{DD}/V_{SS} pair.

Figure 3. Typical layout of V_{DD}/V_{SS} pair



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3 Analog-to-digital converter (ADC)

3.1 Analog power

The ADC unit has an independent, analog supply reference voltage, isolated on input pin V_{DDA}, which allows the ADC to accept a very clean voltage source. This analog voltage supply range is the same as the digital voltage supply range on pin V_{DD}. An isolated analog supply ground connection on pin V_{SSA} provides further ADC supply isolation. Together, the analog supply voltage and analog supply ground connection, offer a separate external analog reference voltage input for the ADC unit on the V_{REF+} pin. This gives better accuracy on low voltage input as follows:

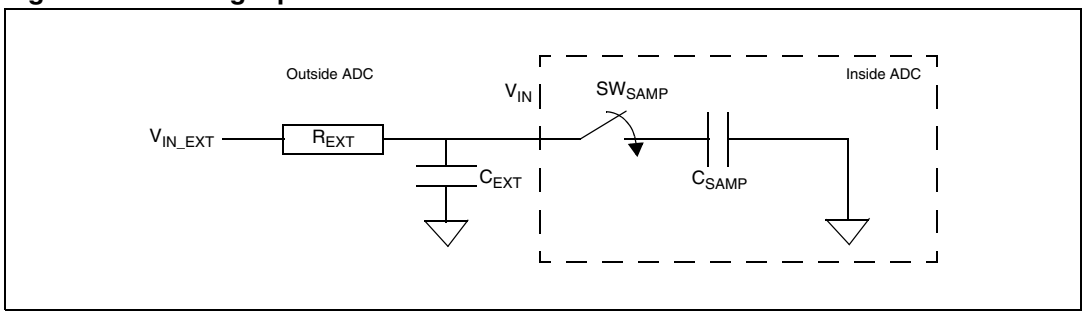
- V_{REF+} (input, analog reference positive): The higher/positive reference voltage for the ADC should be between [250 mV, V_{DDA}]. For more details about V_{REF+} values please refer to the STM8S or STM8A datasheets. This input is bonded to V_{DDA} in devices that have no external V_{REF+} pin (packages with 48 pins or less).
- V_{REF-} (input, analog reference negative): The lower/negative reference voltage for the ADC should be higher than V_{SSA}. For more details about V_{REF-} values please refer to the STM8S or STM8A datasheets. This input is bonded to V_{SSA} in devices that have no external V_{REF-} pin (packages with 48 pins or less).

3.2 Analog input

STM8S and STM8A devices have 16 analog input channels, which are converted by the ADC one at a time, and each multiplexed with an I/O.

The analog input interface of the ADC is shown in *Figure 4*.

Figure 4. Analog input interface



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Equation 1:

$$C_{VIN} = C_{SAMP} + C_{EXT}$$

where:

- C_{VIN} is the total equivalent capacitor on the path of V_{IN}
- C_{SAMP} is the equivalent sampling capacitance
- C_{EXT} is the total external capacitance on the path of V_{IN} to the macro pin. This includes parasitic routing capacitance, pad and pin capacitance and external capacitance. To ensure proper and accurate sampling the following equation must be satisfied

Equation 2:

$$(R_{SW} + R_{EXT}) \times (C_{SAMP} + C_{EXT}) < \left(\frac{3}{10}\right) \times T_S$$

where:

- R_{SW} = 30 kOhm
- R_{EXT} is the total external resistance on the path of V_{IN}
- C_{SAMP} = 3 pF
- T_S = 0.5 µs (for 2 MHz input CLK)

Equation 2 is specific for R_{EXT} and C_{EXT} when designing an analog input interface for the ADC.

Please refer to the STM8S or STM8A datasheets and/or their corresponding reference manual (RM0016) for more details.

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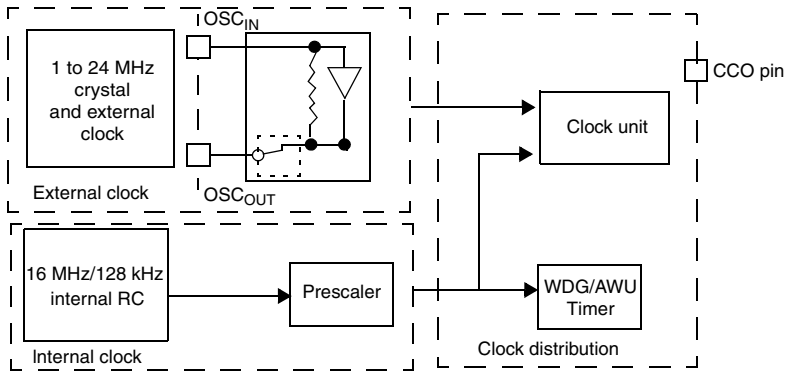
4 Clock management

4.1 Clock management overview

STM8S and STM8A devices offer a flexible way of selecting the core and peripheral clocks (ADC, memory, digital peripherals). The devices have internal and external clock source inputs and one output clock (CCO).

Figure 5. System clock distribution internal clock



For more details please refer to the section on clock management in the datasheet

4.2 Internal clock

The RC oscillator has an internal capacitor (C) and an internal resistor ladder (R). STM8S and STM8A devices have two kinds of internal clock: a high speed internal clock (HSI) running at 16 MHz and a low speed internal clock (LSI) running at 128 kHz.

After reset, the CPU starts with the internal RC (HSI clock signal) divided by 8, i.e. 2 MHz.

4.3 External clock

STM8S and STM8A devices can connect to an external crystal or an external oscillator.

Note: When no external clock is used, OSCIN and OSCOUT can be used as general purpose I/Os.

Figure 6 describes the external clock connections.

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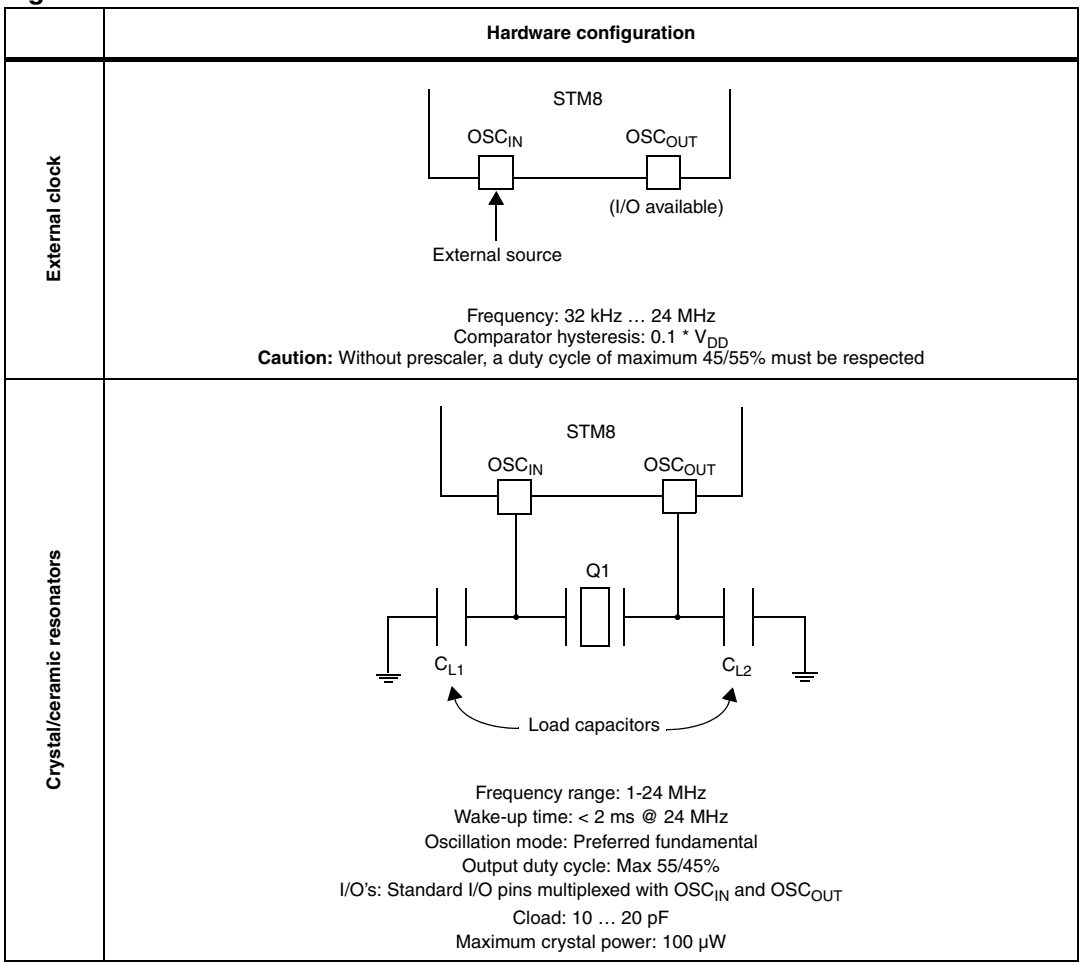
Figure 6. Clock sources



The values of the load capacitors C_{L1} and C_{L2} are heavily dependent on the crystal type and frequency. The user can refer to the datasheet of the crystal manufacturer to select the capacitances. For best oscillation stability C_{L1} and C_{L2} normally have the same value. Typical values are in the range from below 20 pF up to 40 pF (cload: 10 … 20 pF). The parasitic capacitance of the board layout also needs to be considered and typically adds a few pF to the component values.

Recommendations

In the PCB layout all connections should be as short as possible. Any additional signals, especially those that could interfere with the oscillator, should be locally separated from the PCB area around the oscillation circuit using suitable shielding.

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5 Reset control

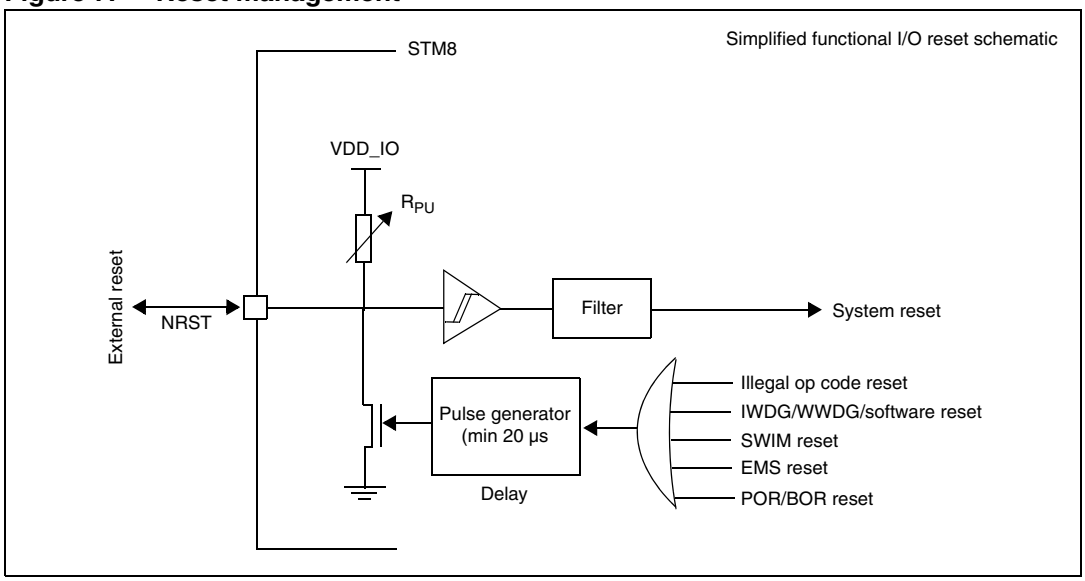
5.1 Reset management overview

The reset cell is a dedicated 5 V bidirectional I/O. Its output buffer driving capability is fixed to Iol_{MIN} = 2 mA @ 0.4 V in the 3 V to 5.5 V range which includes a 40 k pull-up. Output buffer is reduced to the n-channel MOSFET (NMOS). If a 40 k pull-up is accepted, this cell does not include an output buffer of 5 V capability. The receiver includes a glitch filter, whereas the output buffer includes a 20 µs delay.

There are many reset sources, including:

- External reset through the NRST pin
- Power-on reset (POR) and brown-out reset (BOR): During power-on, the POR keeps the device under reset until the supply voltage (V_{DD} and V_{DDIO}) reach the voltage level at which the BOR starts to function.
- Independent watchdog reset (IWDG)
- Window watchdog reset (WWDG)
- Software reset: The application software can trigger reset
- SWIM reset: An external device connected to the SWIM interface can request the SWIM block to generate a microcontroller reset
- Illegal opcode reset: If a code to be executed does not correspond to any opcode or prebyte value, a reset is generated
- Electromagnetic susceptibility (EMS) reset: Generated if critical registers are corrupted or badly loaded

Figure 7. Reset management



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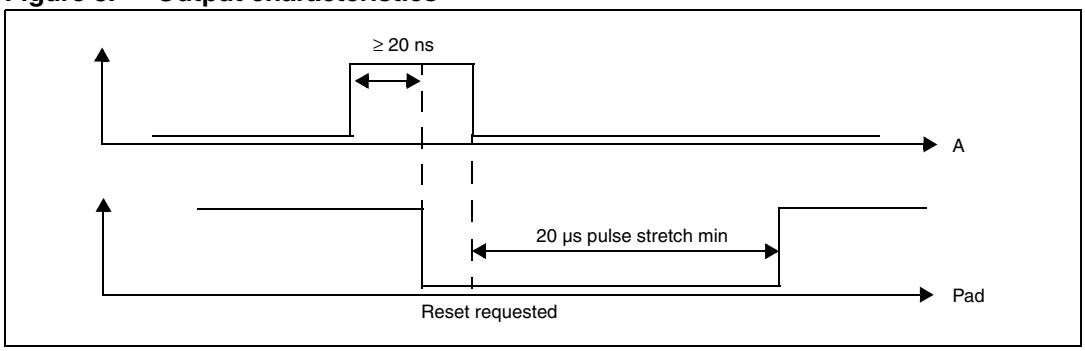
Output characteristics

- A valid pulse on the pin is guaranteed with a ≥ 20 ns pulse duration on the internal output buffer.
- After a valid pulse is recognized, a pulse on the pin of at least 20 µs is guaranteed starting from the falling edge of A.

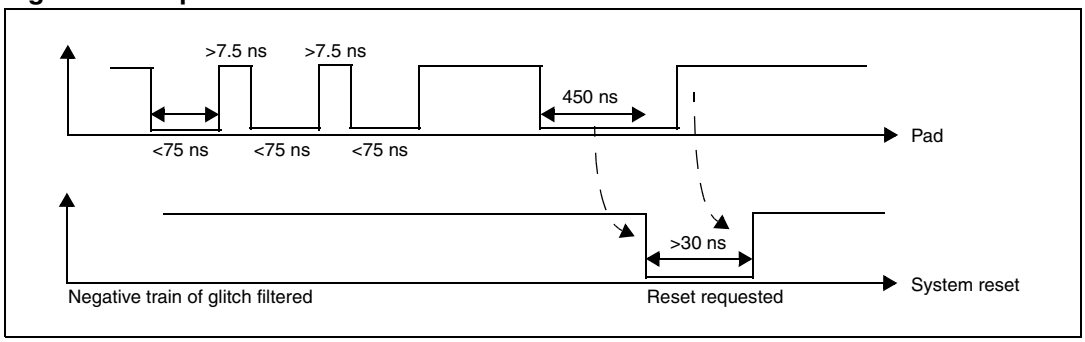
Figure 8. Output characteristics



Input characteristics

- All pulses with a duration less than 75 ns are filtered
- All train/burst spikes with a ratio of 1/10 must be filtered. This means that a negative spike of up to 75 ns is always filtered, when a 7.5 ns interval between spikes occurs (ratio 1/10).
- All pulses with duration more than 450 ns are recognized as valid pulses
- After a valid pulse is recognized, an internal pulse of at least 30 ns is guaranteed

Figure 9. Input characteristics



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6 Recommendations

6.1 Printed circuit board

For technical reasons, it is best to use a multi-layer PCB with a separate layer dedicated to the V_{SS} and another layer to the V_{DD} supply, which results in a good decoupling, as well as a good shielding effect. For many applications, economical requirements prohibit the use of this type of board. In this case, the most important feature is to ensure a good structure for the V_{SS} and power supply.

6.2 Component position

A preliminary layout of the PCB must separate the different circuits according to their electromagnetic interference (EMI) contribution in order to reduce cross-coupling on the PCB, i.e. noisy, high-current circuits, low voltage circuits, and digital components.

6.3 Ground and power supply (V_{SS}, V_{DD})

The V_{SS} should be distributed individually to every block (noisy, low level sensitive, and digital) with a single point for gathering all ground returns. Loops must be avoided or have a minimum surface. The power supply should be implemented close to the ground line to minimize the surface of the supply loop. This is due to the fact that the supply loop acts as an antenna, and is therefore the main emitter and receiver of EMI. All component-free surfaces of the PCB must be filled with additional grounding to create a kind of shield (especially when using single-layer PCBs).

6.4 Decoupling

The standard decoupler for the external power is a 100 µF pool capacitor**.** Supplementary 100 nF capacitors must be placed as close as possible to the V_{SS}/V_{DD} pins of the micro in order to reduce the area of the current loop.

As a general rule, decoupling all sensitive or noisy signals improves electromagnetic compatibility (EMC) performances.

There are 2 types of decouplers:

- Capacitors close to components. Inductive characteristics, which apply to all capacitors beyond a certain frequency, must be taken into account. If possible, parallel capacitors with decreasing values (0.1, 0.01,... µF) should be used.
- Inductors. Although often ignored, ferrite beads, for example, are excellent inductors due to their good dissipation of EMI energy and there is no loss of DC voltage (which is not the case when simple resistors are used).

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6.5 Other signals

When designing an application, the following areas should be closely studied to improve EMC performances:

- Noisy signals (clock)
- Sensitive signals (high impedance)

In addition to:

- Signals for which a temporary disturbance permanently affects operation of the application, for example, interrupts and handshaking strobe signals (but not LED commands).

A surrounding V_{SS} trace for such signals increases EMC performances, as does a shorter length or absence of noisy and sensitive traces (crosstalk effect).

For digital signals, the best possible electrical margin must be reached for the 2 logical states. Slow Schmitt triggers are recommended for eliminating parasitic states.

6.6 Unused I/Os and features

Microcontrollers are designed for a variety of applications, where often a particular application does not use 100 % of the microcontroller resources.

To increase EMC performance, unused clocks, counters, or I/Os, should not be left free, for example, I/Os should be set to ‘0’ or ‘1’ (pull-up or pull-down to the unused I/O pins) and unused functions should be ‘frozen’ or disabled.

Alternatively, unused I/Os can be programmed as push-pull ‘low’ in order to keep them at a defined level but not to use external components.

6.7 User options

STM8S and STM8A devices have user option features that can be used for remapping or enabling/disabling an automatic reset or low speed watchdog. For more details please refer to the product datasheet.

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7 Reference design

7.1 Components reference

Table 1. Component list

ID	Component name	Reference	Quantity	Comments
1	Microcontroller	STM8S and STM8A	1	Refer to the ‘Pinouts and pin description’ and ‘Package characteristics’ sections of the STM8S or STM8A datasheets, to choose the right package
2	Push button	1	1	
3	Resistor	10 kOhm	1	
4	Capacitor	100 nF	5	Ceramic capacitor (decoupling capacitor)
5	Capacitor	1 µF	1	Decoupling capacitor
6	Capacitor	1 µF	1	Main regulator stabilization
7	Capacitor	20..40 pF	2	Used for crystal
8	Crystal	1..24 MHz	1	
9	SWIM connector	4 pins	1	

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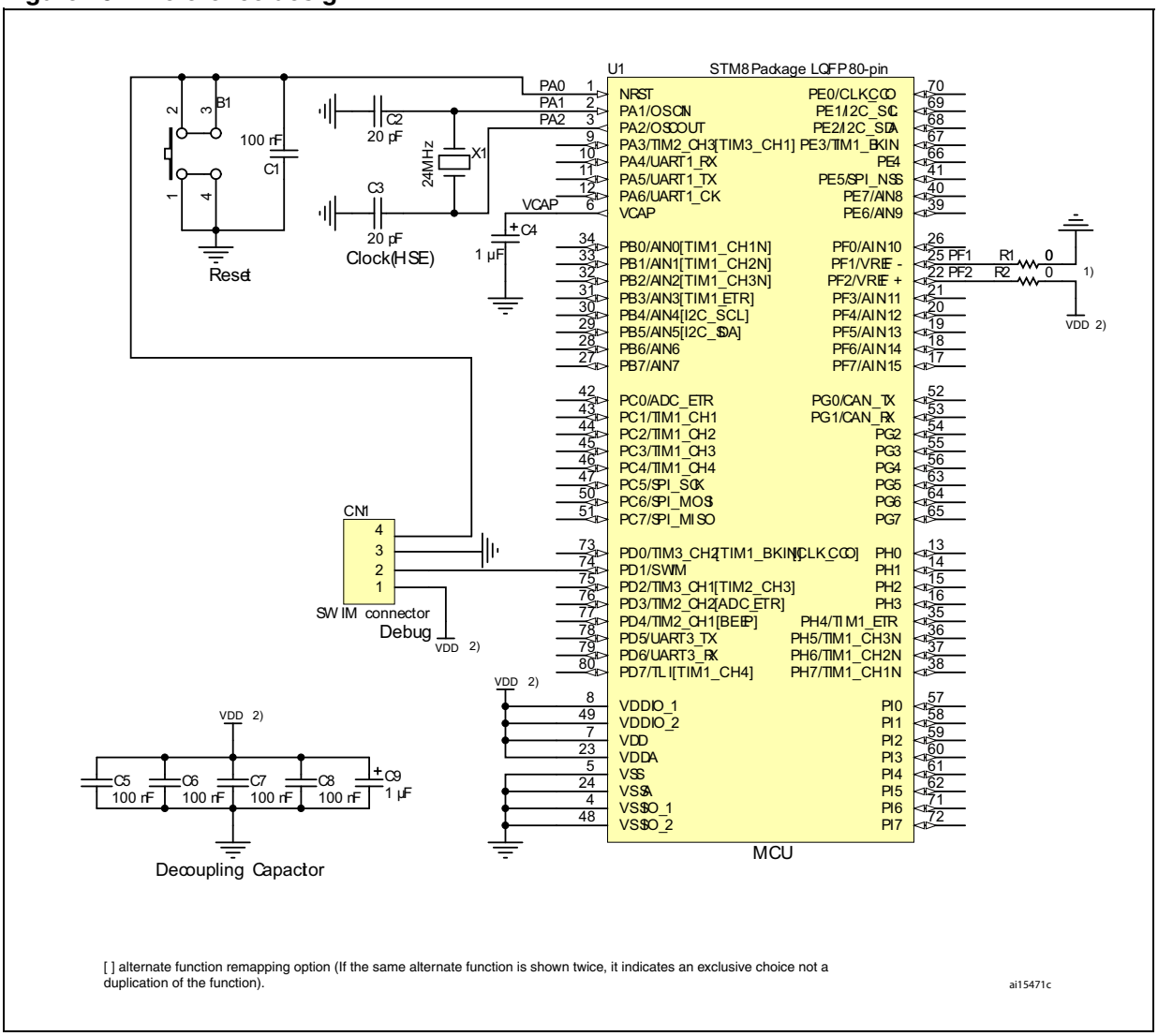
7.2 Schematics

Figure 10. Reference design



1. If pins 22 or 25 are required as GPIO, R1 and R2 should be removed.
2. V_{DD} must be within the allowed supply voltage range of the STM8S or STM8A microcontroller.

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8 STM8 development tools

Development tools for STM8S and STM8A microcontrollers include the STice emulation system supported by a complete software tool package including C compiler, assembler and integrated development environment with high-level language debugger.

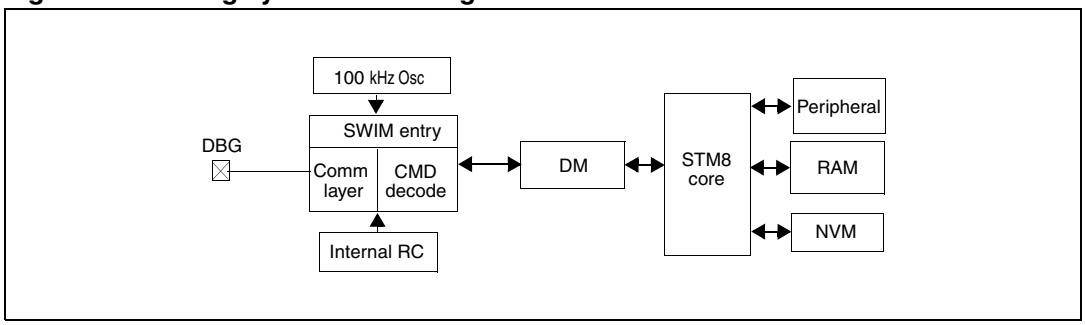
8.1 Single wire interface module (SWIM)

8.1.1 SWIM overview

In-circuit debugging mode or in-circuit programming mode are managed through a single wire hardware interface based on an open-drain line, featuring ultra fast memory programming. Coupled with an in-circuit debugging module, the SWIM also offers a non-intrusive read/write to RAM and peripherals. This makes the in-circuit debugger extremely powerful and close in performance to a full-featured emulator.

The SWIM pin can be used as a standard I/O (with 8 mA capability) which has some restrictions if the user wants to use it for debugging. The most secure way to use it is to provide a strap option on the PCB. Please refer to the STM8 SWIM communication protocol and debug module user manual (UM0470) for more SWIM protocol details.

Figure 11. Debug system block diagram



8.1.2 SWIM connector pins

The SWIM connector pins consist of 4 pins as described in *Table 2*.

Table 2. SWIM connector pins

Pin number	Pin name
Pin 1	V_{DD}
Pin 2	SWIM pin
Pin 3	V_{SS}
Pin 4	Reset

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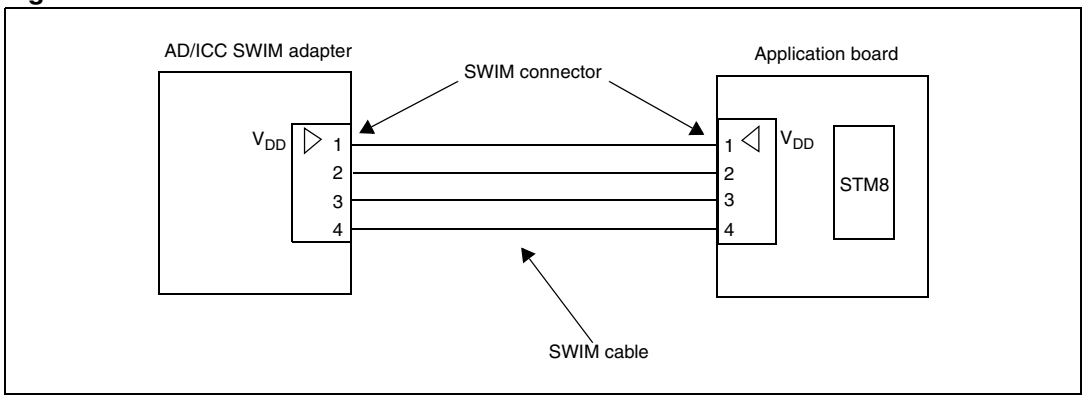
8.1.3 Hardware connection

Figure 12. Hardware connection



Caution: It is recommended to place the SWIM header as close as possible to the STM8S or STM8A device, as this minimizes any possible signal degradation caused by long PCB tracks.

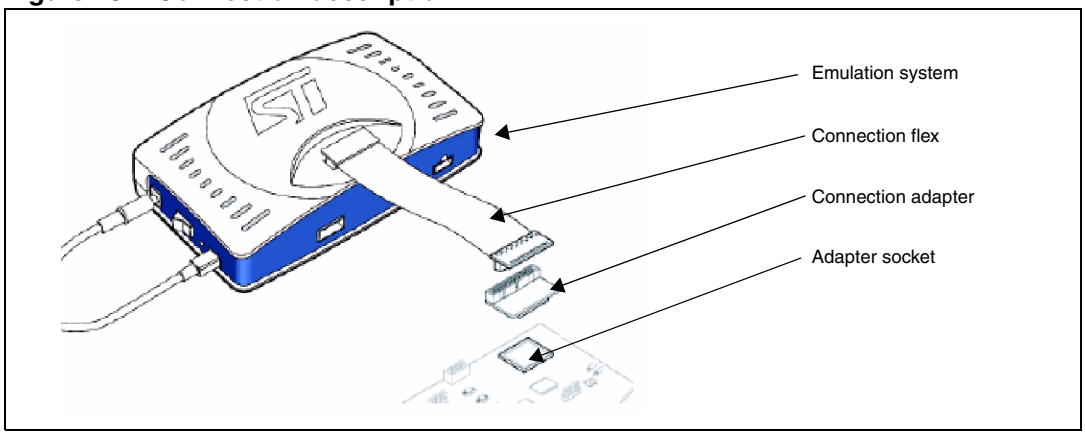
8.2 Emulator STice

8.2.1 STice overview

The STice is a modular, high-end emulator system which connects to the PC via a USB interface, and to the application board in place of the target microcontroller.

It is supported by the free STM8 toolset: IDE ST visual develop (STVD) programmer, ST visual programmer (STVP) and STM8 assembler. Please refer to the STice emulator for STM8 for more details.

Figure 13. Connection description



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Emulation system: STice

- Emulator box
- Cables for USB, power supply, trigger, analyzer input

Connection flex

- 60-pin or 120-pin cable for connection to the application board

Connection adapter

- Links the connection flex to the footprint of the STM8S or STM8A microcontroller

Adapter socket

- Package-specific socket for connection adapter and STM8S or STM8A microcontroller

8.2.2 STice in emulation configuration

In emulation configuration, the STice is connected to the PC via a USB interface and to the application board in place of the target microcontroller being used.

- Connection flex: Flexible cable (60-pin or 120-pin depending on the target microcontroller) that relays signals from the STice to the application board
- Connection adapter: Links the connection flex to the footprint of the target microcontroller on the users application board.
- Adapter socket: Socket that solders to the application board in place of the microcontroller and receives the connection adapter.

The above accessories are not included with the STice system. **To determine exactly what is required for any supported microcontroller, refer to the online product selector on *www.st.com*.**

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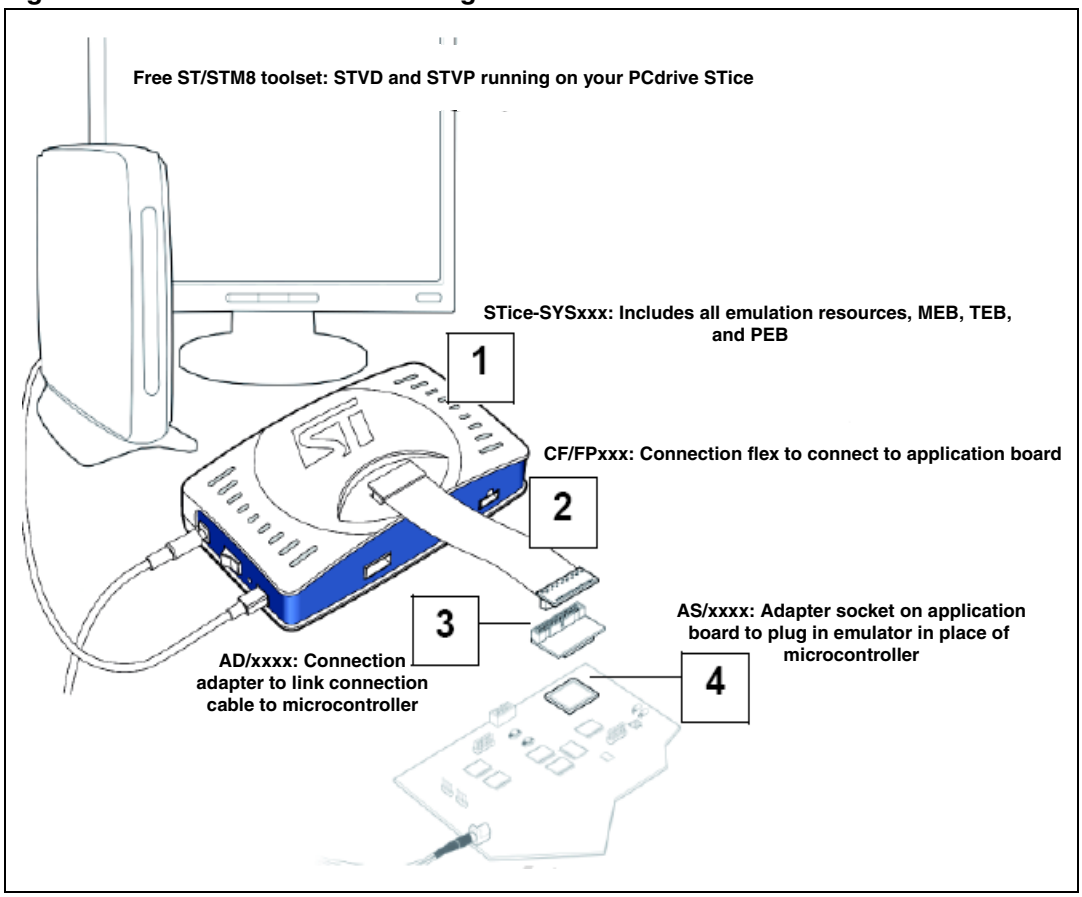
Figure 14. STice in emulation configuration


Free ST/STM8 toolset: STVD and STVP running on your PCdrive STice
STice-SYSxxx: Includes all emulation resources, MEB, TEB, and PEB
1
CF/FPxxx: Connection flex to connect to application board
2
3
AS/xxxx: Adapter socket on application board to plug in emulator in place of microcontroller
AD/xxxx: Connection adapter to link connection cable to microcontroller
4

8.2.3 In-circuit programming and debugging

In the in-circuit debugging/programming configuration, STice allows the application to be programmed in the microcontroller and for the application to be debugged while it runs on the microcontroller on the application board. STice supports the SWIM protocol, making it possible to in-circuit program and debug the microcontroller using only one general purpose I/O.

In both the emulation and the in-circuit programming/debugging configuration, STice is driven by the ST visual develop (STVD) or ST visual programmer (STVP) integrated development environment running on the host PC. This provides total control of advanced application building, debugging and programming features from a single easy-to-use interface.

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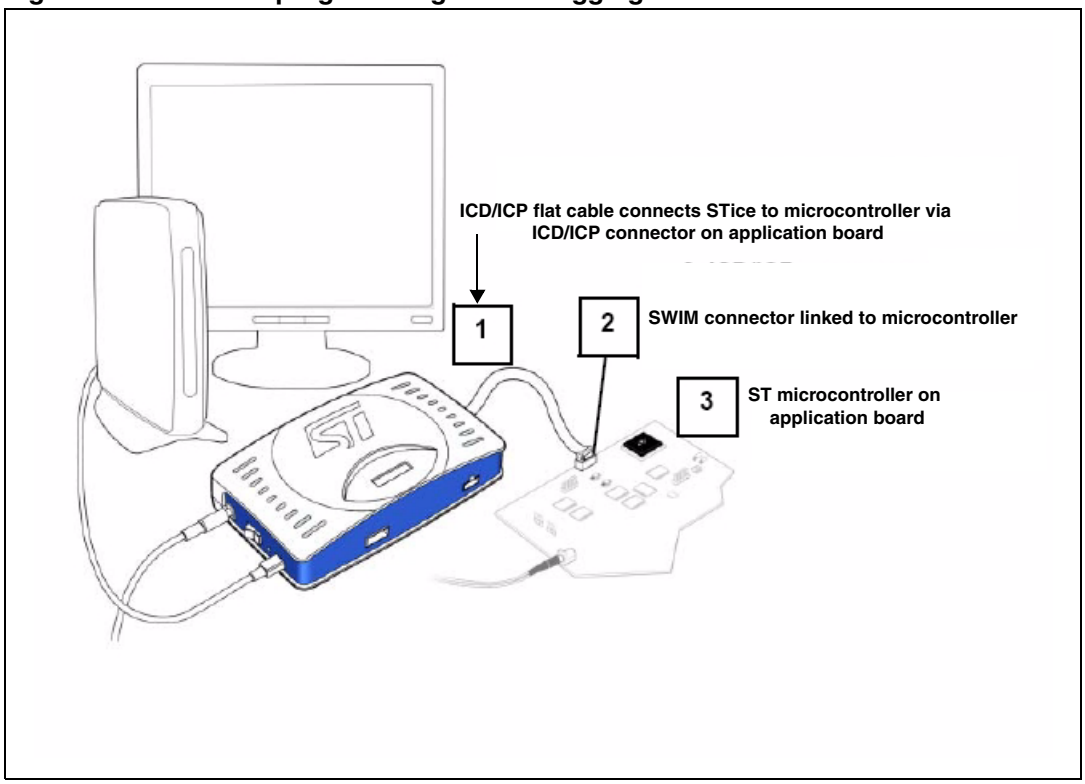
Figure 15. In-circuit programming and debugging



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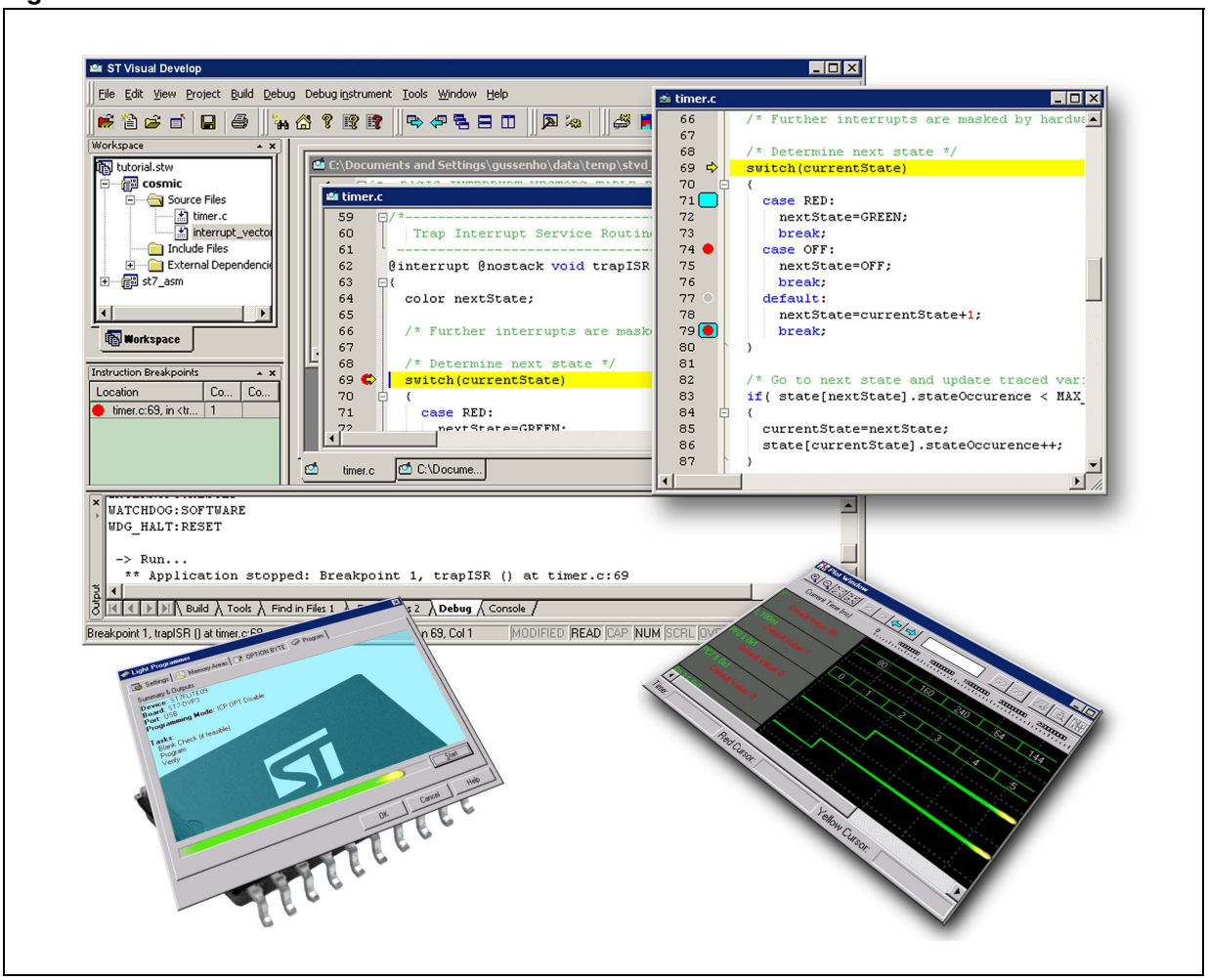
9 STM8 software toolchain

In order to write, compile and run the first software on an STM8S or STM8A device, the following components of the software toolchain are required (see *Figure 16*):

- Integrated development environment
- Compiler
- Firmware library (optional, used to ease the start-up)

Figure 16. STM8 software toolchain



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9.1 Integrated development environment

The integrated development environment ST visual develop (STVD) provides an easy-to-use, efficient environment for start-to-finish control of application development, from building and debugging the application code to programming the microcontroller. STVD is delivered as part of the free ST toolset, which also includes the ST visual programmer (STVP) programming interface and the ST assembler linker.

To build applications, STVD provides seamless integration of C and assembly tool chains for ST including the Cosmic and Raisonance C compilers and the ST assembler linker. When debugging, STVD provides an integrated simulator (software) and supports a complete range of hardware tools including the low-cost RLink in-circuit debugger/programmer and the high-end STice emulator.

To program applications to an STM8S or STM8A device, the STVD also provides an interface for reading from the microcontroller memories, writing to them and verifying them. This interface is based on the ST visual programmer (STVP), and supports all the target devices and programming tools supported by STVP.

The free ST toolset for STM8 is available from STMicroelectronics homepage (see *www.st.com*).

9.2 Compiler

STM8S and STM8A devices can be programmed by a free assembler toolchain which is included in the ST toolset.

As the core is designed for optimized high-level-language support, use of a C compiler is recommended!

C compilers for STM8 are offered by the third party companies Cosmic and Raisonance.

A free version of the C compiler with up to 16 Kbytes of generated code is available at: www.cosmic-software.com and www.raisonance.com.

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9.3 Firmware library

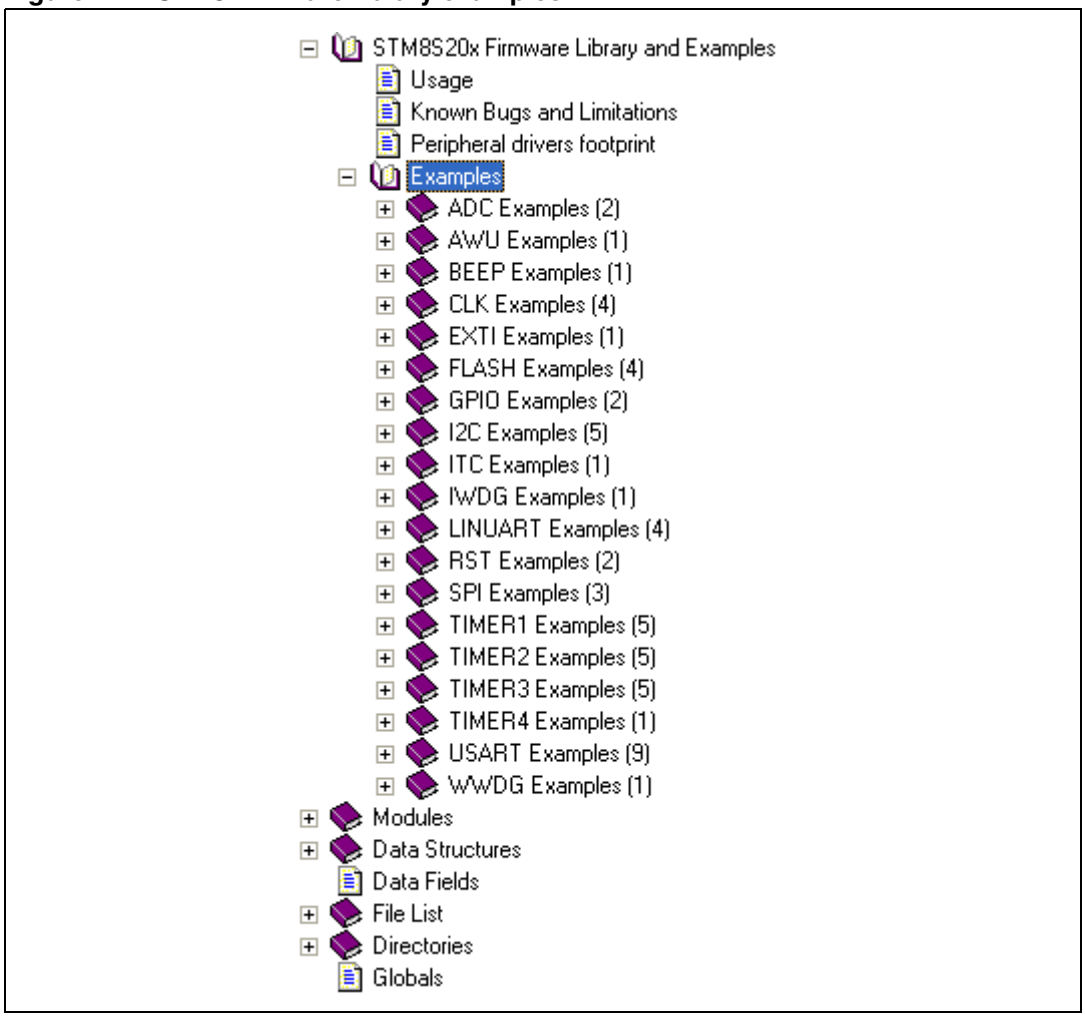
The STM8 firmware library is a complete set of source code examples for each STM8 peripheral. It is written in strict ANSI-C and it is fully MISRA C 2004 compliant (see *Figure 17*).

All examples are delivered with workspace and project definition files for STVD and Cosmic C compiler which enables the user to load and compile them easily into the development environment.

The examples run on the STMicroelectronics STM8 evaluation board and can be tailored easily to other types of hardware.

For additional information on the STM8 firmware library, please contact STMicroelectronics.

Figure 17. STM8 firmware library examples



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10 Setting up the STM8 development environment

The STM8 development environment setup looks different depending on the supplier of the software (SW) and hardware (HW) tools.

Typical setups are described below for the following SW and HW tools:

- STM8 C compiler from Cosmic
- ST toolset and STM8 firmware library from STMicroelectronics
- HW debug interface "Rlink" from Raisonance
- STM8 evaluation board from STMicroelectronics

10.1 Installing the tools

All software tools are delivered with a setup wizard which guides the user through the installation process. It is recommended to install the tools in the following order:

1. C compiler
2. ST toolset
3. STM8 firmware library

The Rlink does not need any dedicated software installation in the STM8 development environment because the necessary drivers are delivered with the ST toolset.

Note: These R-link drivers must be launched separately as follows: Start/Programs/STtoolset/Setup/Install Rlink driver.

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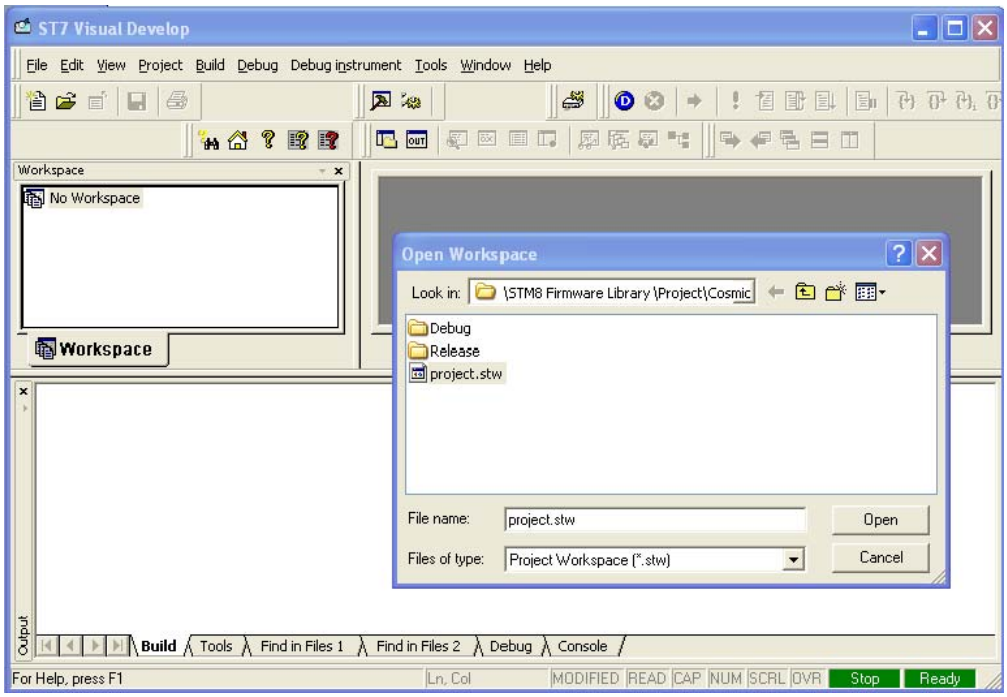
10.2 Using the tools

Once the tools installation is complete, the ST visual develop (STVD) integrated development environment can be launched.

The user then has the choice to generate either a new workspace with a new project or to open an existing workspace. If using the STVD for the first time, it is recommended to open an existing project from the STM8 firmware library.

The STM8 firmware library includes several examples for each peripheral plus one workspace containing a project which is already configured for the dot-matrix-display of the STM8 evaluation board. It is located in the firmware subdirectory \Project\Cosmic (see *Figure 18*).

Figure 18. STVD open example workspace



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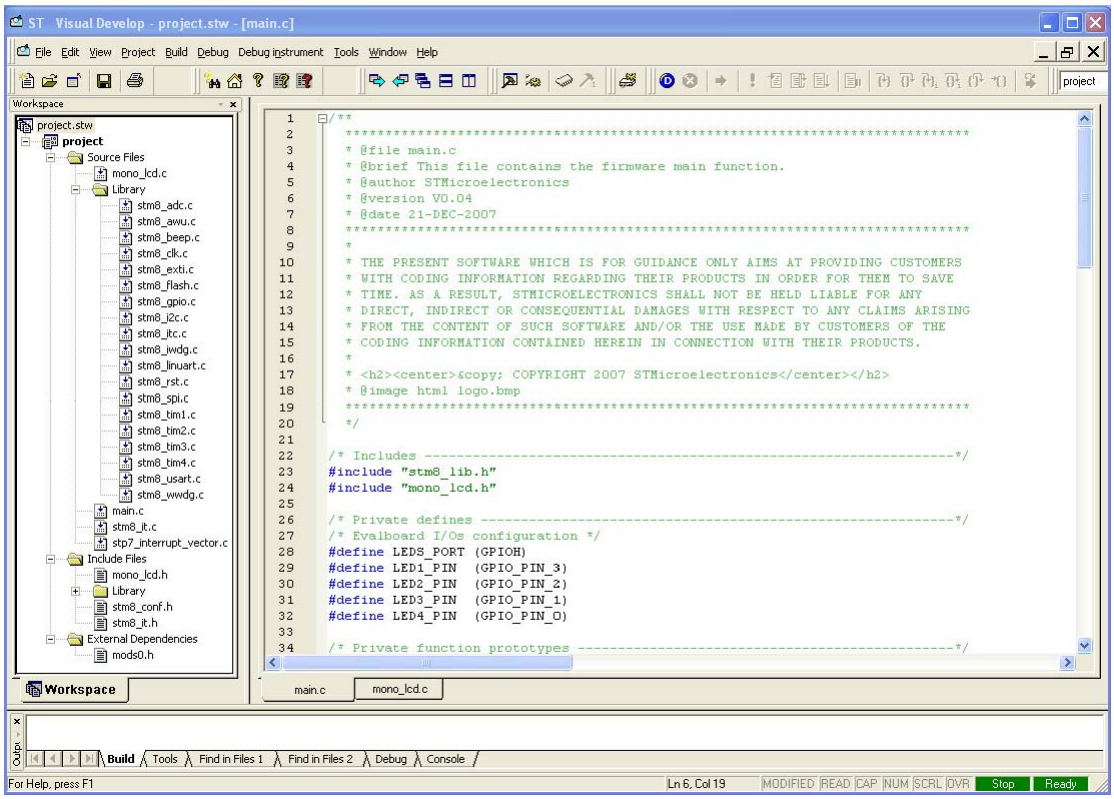
10.2.1 Project editing

All project source files are visible and can be edited (see *Figure 19*).

Figure 19. STVD MCU edit mode



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10.2.2 Online help

An online help manual is available inside the firmware installation directory (see *Figure 20*) to help the user understand the structure of the STM8 firmware library.

Figure 20. STM8 firmware library online help manual

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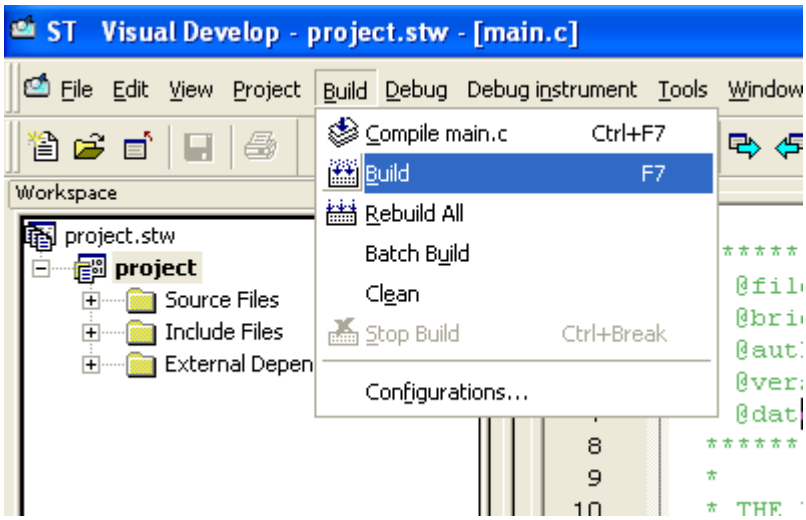
10.3 Running the demonstration software

To run the demonstration software on the STM8 evaluation board, the project has to be compiled and the correct HW tool must be selected before the debug session can be started.

10.3.1 Compiling the project

The project can be compiled using the ‘Build’ function in the ‘Build’ menu (see *Figure 21*).

Figure 21. STVD: Building the project



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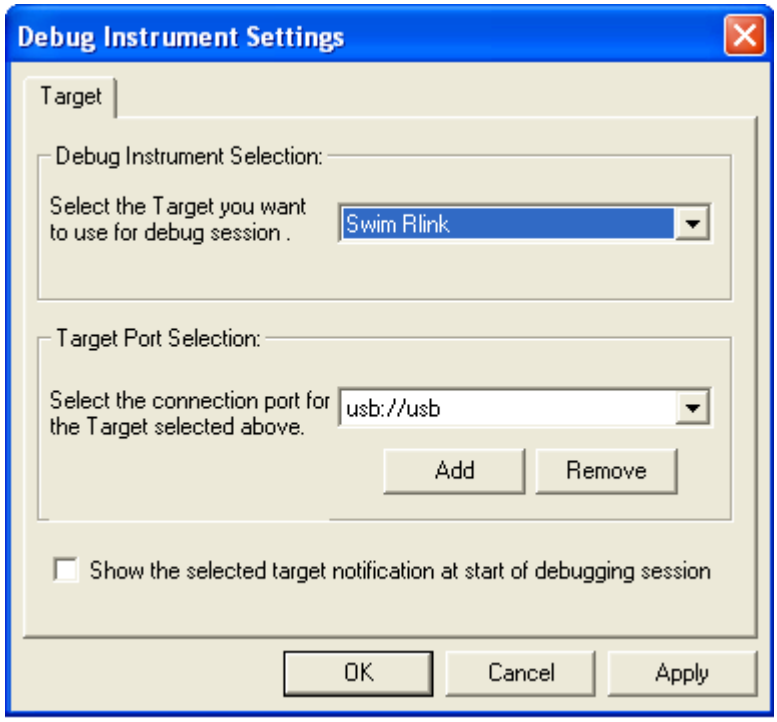
10.3.2 Selecting the correct debug instrument

In the example below, the Rlink tool is used for communicating via the SWIM interface with the on-board debug module of the STM8.

The Rlink tool can be selected from the ‘Debug Instrument Selection’ list in the ‘Debug Instrument Settings’ dialog (see *Figure 22*).

Figure 22. STVD: Selecting the debug instrument



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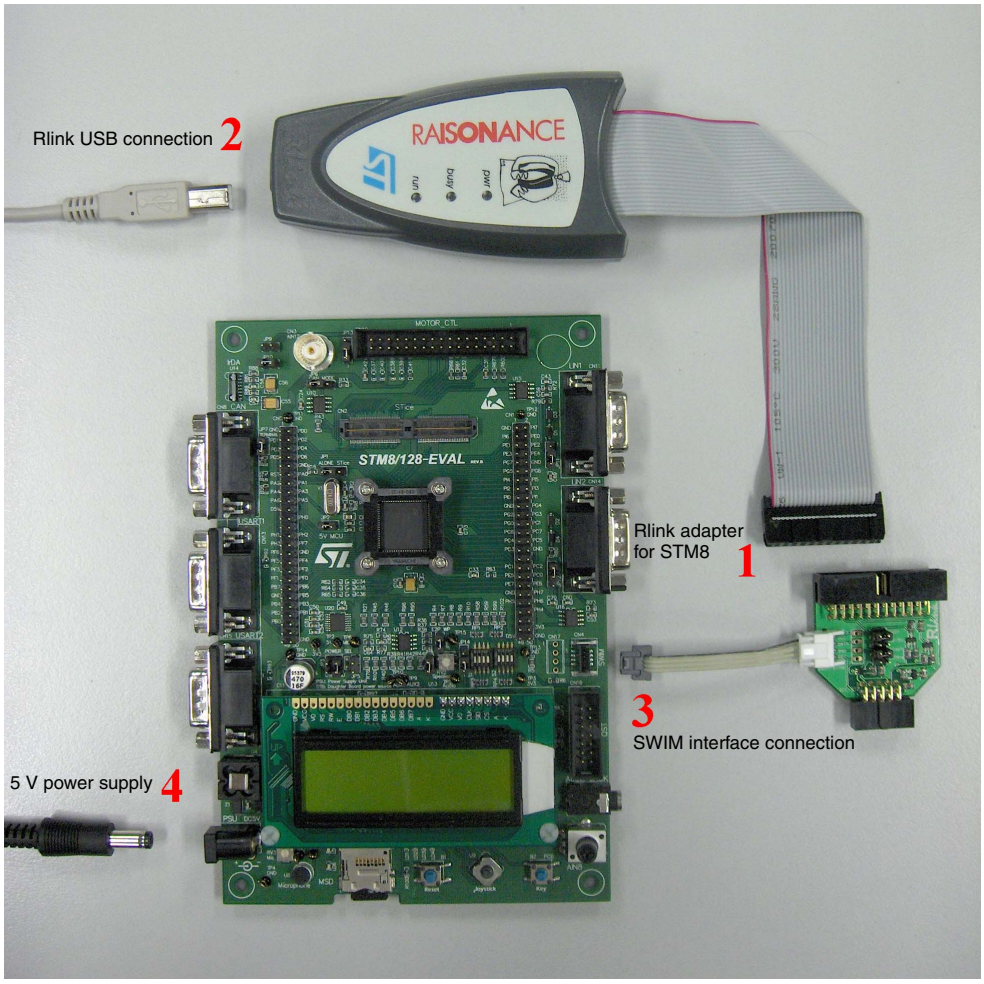
10.3.3 Connecting the hardware

The Rlink tool can be connected to the PC by a standard USB connection. It is also powered by the USB interface.

On the controller side the connection to the STM8 evaluation board is made by the SWIM interface cable. The STM8 evaluation board is powered by an external 5 V supply (see *Figure 23*).

Figure 23. Connecting the debug instrument to the STM8 evaluation board



Caution: On the Rlink ICC/SWIM adapter board, the “SWIM” jumper must be set.
If there is no pull-up on the application SWIM line, the “ADAPT” jumper is also set.
In any case, “PW-5V” and “12MHz” jumpers must not be set.

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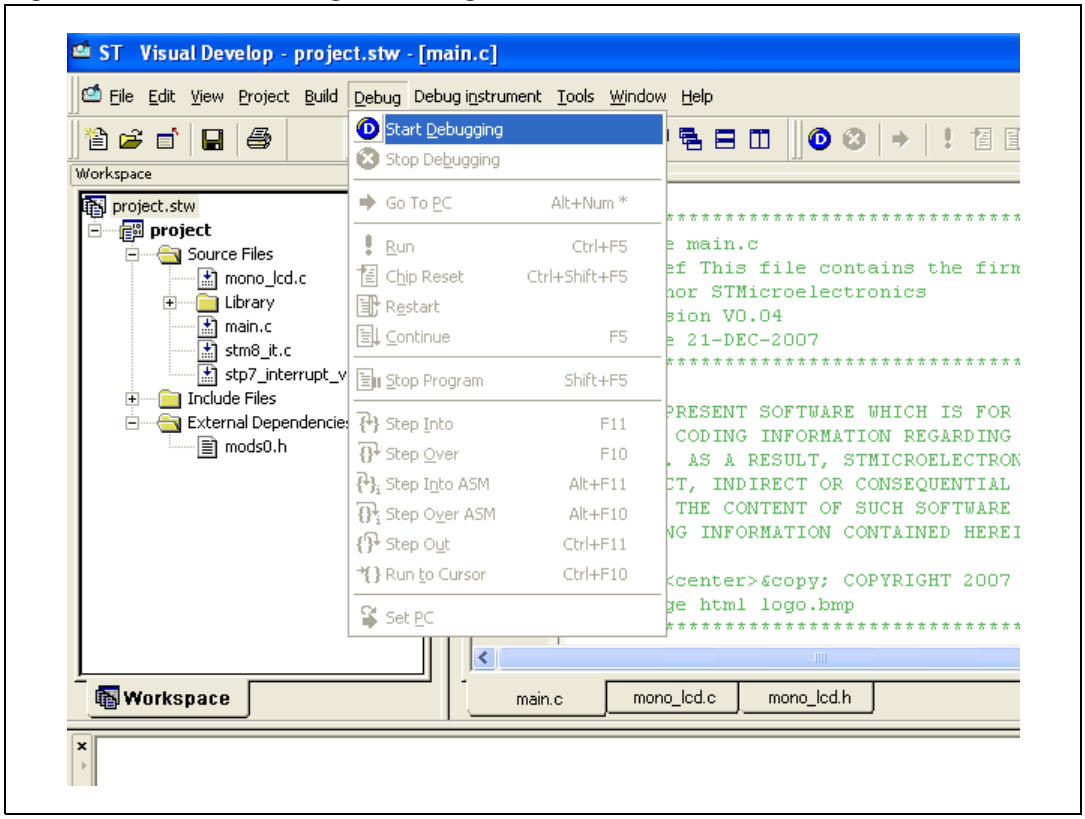
10.3.4 Starting the debug session

Debug mode can be entered by the command 'Debug Start Debugging' (see *Figure 24*).

Figure 24. STVD: Starting the debug session



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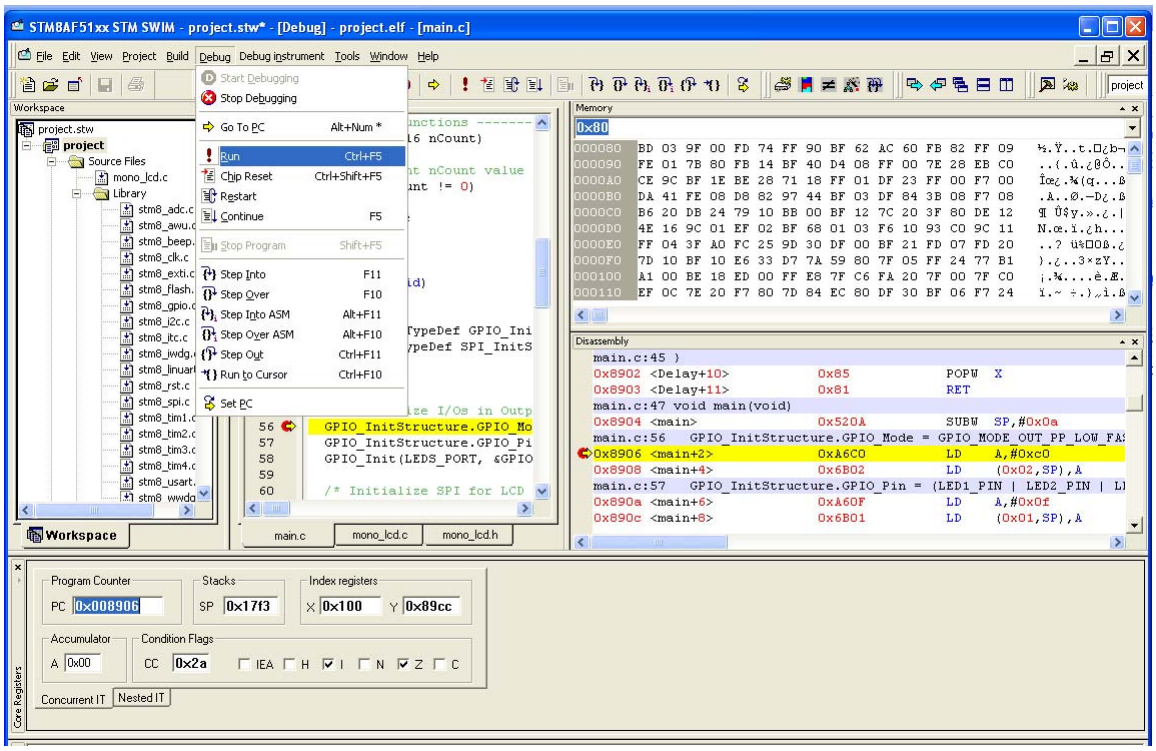
10.3.5 Running the software

After entering debug mode, the software can be started by the run command in the menu ‘Debug Run’ (see *Figure 25*).

Figure 25. STVD: Run the software



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The LCD display on the STM8 evaluation board indicates a successful debug session (see *Figure 26*).

Figure 26. STM8 evaluation board

10.3.6 Follow up

Step by step, additional peripherals of STM8S and STM8A devices can be run, following on from the initial debug session described above.

Many features of STM8S and STM8A devices are supported by dedicated hardware on the STM8 evaluation board. The necessary software drivers (CAN driver, LIN driver, buttons, memory cards, buzzer, etc) are delivered in the STM8 firmware library.

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11 Documentation and online support

Documentation resources related to tool usage includes:

Application

- STM8S datasheets:
  - STM8S207xx STM8S208xx
  - STM8S105xx
  - STM8S103K3 STM8S103F3 STM8S103F2
  - STM8S903K3 STM8S903F3
  - STM8S003K3 STM8S003F3
- STM8A datasheets:
  - STM8AF52xx STM8AF6269/8x/Ax STM8AF51xx STM8AF6169/7x/8x/9x/Ax
  - STM8AF622x/4x STM8AF6266/68 STM8AF612x/4x STM8AF6166/68
- How to program STM8S and STM8A Flash program memory and data EEPROM (PM0051)
- STM8S and STM8A microcontroller families reference manual (RM0016)
- STM8 CPU programming manual (PM0044)

Tools

- STM8 firmware library and release note (detailed descriptions of the library are included as help files)
- STice advanced emulation system for ST microcontrollers data briefing
- STice user manual
- Cosmic C compiler user manual
- STM8/128-EVAL evaluation board user manual (UM0482)
- ST visual develop tutorial (included as help files in the ST-toolchain)
- ST visual develop (STVD) user manual
- STM8 SWIM communication protocol and debug module user manual (UM0470)

The microcontroller discussion forum on *www.st.com* can be used by developers to exchange ideas. It is the best place to find different application ideas. In addition, the website has a knowledge base of FAQs for microcontrollers, which provide answers to many queries and solutions to many problems.

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12 Revision history

Table 3. Document revision history

Date	Revision	Changes
03-Jun-2008	1	Initial release
01-Sep-2008	2	STM8S207/208 replaced by STM8S20xxx *Figure 10: Reference design on page 19* and *Figure 12: LQFP 80-pin pinout on page 21* modified to be in line with the pin description of the STM8S20xxx datasheet *Figure 7: Reset management on page 14* modified
01-Apr-2009	3	Modified *Section 2.2: Main operating voltages on page 8*
05-Aug-2011	4	*Table 1: General operating conditions*: replaced *Figure 10: Reference design on page 19*: updated the value of the C4 capacitor.
31-Aug-2011	5	Added STM8A throughout the document as this revision covers STM8A devices. Replaced “Root part number 2” with STM8S and STM8A. Updated *Section 2.2: Main operating voltages*: removed *Table 1: General operating conditions* and added a reference to the STM8S and STM8A datasheets. Removed *Section 5.2: Hardware reset implantation*. *Table 1: Component list*: updated ‘Reference’ value for ‘ID’ 6. Removed *Section 7.3: Pinouts*. Updated references in *Section 11: Documentation and online support*

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